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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,334	04/03/2007	Weixing Wu	SHANP104US	4526

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EXAMINER	
KOSAR, AARON J	

ART UNIT	PAPER NUMBER
1651	

NOTIFICATION DATE	DELIVERY MODE
07/21/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/551,334	WU ET AL.	
	Examiner	Art Unit	
	AARON J. KOSAR	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30 and 36-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30 and 36-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment and argument filed May 3, 2010, in response to the non-final rejection, are acknowledged and have been fully considered. Any rejection and/or objection of record not specifically addressed is herein withdrawn.

Applicant has amended the claims by canceling claims 10-29 and 31-35. Claims 30 and 36-38 are pending and have been examined on the merits.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 30 and 36-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 30 at lines 2-3 recites the phrase “adding an anticoagulant into whole blood establishing a circulatory system”; however, it is unclear if Applicant intends for the circulatory system in the method to be established by the "adding anticoagulant", if “establishing” a circulatory system is the same or a different step from the adding, or if another interpretation is intended. Clarification is required.

Claim 30 recites the terms “a circulatory blood" in line 1-2, “whole blood” in line 2, “a circulation system” in line 3, and the phrase “at least one virus in the plasma” at lines 6-7; however it is unclear if the terms are the same or different blood samples, it is unclear if the circulatory/whole blood in lines 1-5 contain a virus or if said virus is merely exemplary, and it is unclear what system and/or what circulation is intended by the claims. Clarification is required.

Claim 30 at line 2-4, 12, and 13 recites the phrases “establishing a circulation system”, “separating the whole blood” and “transfusing the reconstituted whole blood into the circulation system”; however, the “separating" in line 3 is unclear because the claim does not require separating the whole blood or the plasma and/or blood cells from any environment or object external to the whole blood (e.g. from the circulation system) and thus it is unclear which components in the method are capable of being transfused into the circulation system. Clarification is required.

All other claims depend directly or indirectly from the rejected claims and are, therefore, also rejected under 35 USC § 112, second paragraph, for the reasons set forth above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 30 and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saalmann (WO 00/59551 A1) in view of Stedman (U.S. Patent No. 6,177,403), Park (U.S. Patent No. 5,516,629), Morrison (U.S. Patent No. 3,677,667), Broussard et al (U.S. Patent No. 3,989,740), Smith et al (U.S. Patent No. 3,223,642), Fantini et al (Applied Optics, 1994, 33(22), pp. 5204-5213), and Prahl (Oregon Medical Laser Center <omlc.ogi.edu/spectra/mb /index.html>, 3 pages.), and Šikurová (Laser Physics, 2003, 13(2), pp. 217-221.)

A method of illuminating viruses (such as the elected species of Sindbis virus) in blood is claimed - the method comprising adding anticoagulant into whole blood, separating plasma from blood cells; mixing methylene blue with the plasma; and illuminating the mixture. The dependent claims recite the sources of obtaining the blood, the species of Sindbis virus, and a degree of virus removal from the blood.

Saalmann teaches a method of exposing viruses to photosensitizers, the method comprising obtaining a body fluid sample containing a virus (including HIV) and separating the sample into blood plasma and corpuscular elements (blood cells); mixing a photosensitizing phenothiazine dye such as methylene blue with the plasma phase of the sample; and then bombarding the plasma with electromagnetic radiation such as visible light (illuminating the methylene blue-plasma mixture). Saalmann also discloses reinfusing/transfusing the plasma back into the patient as separate fractions or as reconstituted blood (see entire document, for example page 4, lines 10-11; page 10 line 11) and performing the reinfusing via a filtering device (page 8, line 18).

Saalmann does not expressly teach providing whole blood with anticoagulant or *Sindbis* virus, treating for 60 seconds or with an LED, providing a peristaltic pump, or filtering with attpulgite (Fuller's earth).

Stedman teaches mixing whole blood with heparin (an anticoagulant) and then separating the heparinized blood's red blood cells from the plasma (see entire document, for example col 26, lines 11-14).

Broussard et al teaches removal and filtering of methylene blue with Fuller's earth (attpulgite) whereby Fuller's earth is further taught to show "a very strong and uncommon affinity for methylene blue" (see whole document, for example col 2, lines 50-53).

Smith teaches filtering with fuller's earth (see entire document, for example col 13, lines 60-61).

Park teaches a method of photodynamically inactivating blood-borne viral and bacterial contaminants, including blood contaminated with Human Immunodeficiency Virus-1 (HIV-1) and Sindbis virus (see entire document, for example col 8, lines 29-37).

Morrison teaches a blood and fluid-pumping peristaltic pump (see entire document, for example col 1, lines 57-61).

Prahl teaches the absorption spectrum of methylene blue from 200-800nm and the absorption coefficients thereof, including the peak between 400 and 800 nm and the absorption maximum (peak extinction wavelength, λ_{max}) thereof (see entire document, for example figure (molar ext. coeff. vs. wavelength) at page 1).

Fantini et al teaches that methylene blue (MB) has a maximum absorbance at a wavelength of 664nm, a variety of individual light-emitting diodes (LED's) having maximum intensities between 570 and 870nm, and peak-widths thereof distributed between 500 and 900nm (see whole document, for example abstract; figures 1, 5, 6; page 5206, sections A and B).

It would have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have added anticoagulant into the blood or the separated fractions thereof in the method of Saalmann so as to provide an anticoagulant-containing blood sample as adding anticoagulant to whole blood is beneficially taught by Stedman which teaches heparinizing (anticoagulating) blood before separating the blood into plasma and blood cells, making adding heparin (coagulant) to blood an obvious choice in the separating method of Saalmann.

Saalmann is relied upon for the reasons discussed above. If not expressly taught by Saalmann, based upon the overall beneficial teaching provided by this reference with respect to providing in the method any blood infected with a virus (e.g. page 4, lines 2-3) and providing a pump thereto, and if necessary, based upon the beneficial respective teachings of Park and Morrison with respect to providing blood infected with a variety of viruses including Sindbis virus and with respect to providing a peristaltic pump to pump blood (thereby making the selection of a virus-infected blood, a source thereof, and the selection of a pump a mere matter of choice on the part of one of skill in the art), in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable pump, blood or source thereof or virus contained therein, and thus the extent (%) of removal of the virus in the method), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

Also, if not expressly taught by Saalmann, based upon the overall beneficial teaching provided by this reference with respect to providing in the method purification, based upon the beneficial respective teachings of Broussard with respect to providing attapulgite (Fuller's earth)

filtration and Smith which teaches filtering with Fuller's earth (thereby making the selection of filtration/filtering material a mere matter of choice on the part of one of skill in the art), in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable filtering material and the extent of filtering thereof), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

Further, if not expressly taught by Saalmann, based upon the overall beneficial teaching provided by this reference with respect to providing in the method any blood infected with a virus (e.g. page 4, lines 2-3) and providing a pump thereto, and if necessary, based upon the beneficial respective teachings of Park and Morrison with respect to providing blood infected with a variety of viruses including Sindbis virus and with respect to providing a peristaltic pump to pump blood (thereby making the selection of a virus-infected blood, a source thereof, and the selection of a pump a mere matter of choice on the part of one of skill in the art), in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable pump, blood or source thereof or virus contained therein, and thus the extent (%) of removal of the virus in the method), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

If not expressly taught by Saalmann, based upon the overall beneficial teaching provided by this reference with respect to providing in the method any blood infected with a virus (e.g. page 4, lines 2-3) and providing a pump thereto, and if necessary, based upon the beneficial respective teachings of Park and Morrison with respect to providing blood infected with a variety

of viruses including Sindbis virus and with respect to providing a peristaltic pump to pump blood (thereby making the selection of a virus-infected blood, a source thereof, and the selection of a pump a mere matter of choice on the part of one of skill in the art), in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable pump, blood or source thereof or virus contained therein, and thus the extent (%) of removal of the virus in the method), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

It would have been obvious to a person of ordinary skill in the art at the time the instant invention was made to have provided in the method an LED source or excitation wavelength thereof because Saalmann teaches providing light in the range of the 380-780nm (page 9, lines 6-7) which was known at the time of the instant invention as shown by Prahl and Fantini that this range embraces the absorption for methylene blue including the known absorption maximum thereof (Fantini: 664nm; Prahl/Merck: 668nm). One would have been motivated to have provided an LED proximal to the λ_{max}, including providing an LED of about the maximum absorption wavelength, of methylene blue because Šikurová teaches that 630nm light provides an increased light-delivery (radiant/excitatory power) to blood and plasma (see entire document, for example figure 1 page 218), because one would want to provide efficient transfer of activating light to the methylene blue whereby Prahl teaches that the molar extinction coefficient/absorption coefficient increases with wavelengths approaching the absorption maximum; and because as taught by Fantini, LEDs providing wavelengths overlapping with the excitation of methylene blue and the absorption maximum thereof were known to the skilled

artisan at the time the instant invention was made (e.g. Fantini fig. 1, including LED's 1-5). One would have had a reasonable expectation of success in providing an LED to the method of Saalmann, because success merely requires providing exciting the same compound, methylene blue, with at the same light within the range of Saalmann to effect the same methylene blue excitation result, and especially in the absence of evidence to the contrary.

If not expressly taught by Saalmann, based upon the overall beneficial teaching provided by this reference with respect to providing a period of time for obtaining inactivation, and based upon the beneficial respective teachings of Prahl which teaches submaximal absorption of methylene blue ±30nm from the λ_{max} (thereby making the selection of a wavelength or range thereof and intensity (absorption) thereof a mere matter of choice on the part of one of skill in the art), in the manner disclosed therein, the adjustments of particular conventional working conditions (e.g., determining one or more suitable excitation wavelength, intensity, and duration thereof, and thus also the extent (%) of removal of the virus in the method), is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan.

From the teachings of the reference, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was prima facie obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Response to Arguments

Applicant has argued that Saalmann teaches a piston pump and does not teach mixing methylene blue with a peristaltic pump. Applicant has also argued providing a flow rate a range thereof, and an $LgTCID_{50}$ more than 4.5. Applicants' arguments as they pertain to the art rejections above have been carefully considered but are not deemed to be persuasive of error in the rejections as instantly set forth above and for the following reasons.

Regarding Applicant's argument that Saalmann teaches a piston pump, this teaching of Saalmann in light of the broader teaching of a pump (page 7 line 28; claim 1) still embraces the alternatives and thus does not exclude peristaltic pumps and, further, is not persuasive of error over the grounds of rejection, for the reasons set forth above.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., flow rate, a range of flow rates thereof, and an $LgTCID_{50}$, a light source of 630nm and selection of the source close to the peak absorption of methylene blue) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

No claims are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Corash, L. ("Inactivation of Infectious Pathogens in Labile Blood Components: Meeting the Challenge" Transfus.Clin.Biol. June 2001,8(3), pp.138-45.) considered relevant prior art in teaching the state of the art of blood plasma virus photo-inactivation and transfusion prior to the instant invention (see whole document).

World Health Organization, ("Annex 4: Guidelines on Viral Inactivation and Removal Procedures Intended to Assure the Viral Safety of Human Blood Plasma Products" WHO Technical Report, Series No. 924, 2004, pages 150-224.) considered relevant in teaching the state of the art of blood plasma virus photo-inactivation, including separated-plasma Sindbis virus inactivation with methylene blue, around the time of the instant invention (see whole document, for example table 15; §5).

Schmidt, M.H.(" Light-emitting Diodes as a Light Source for lntraoperative Photodynamic Therapy" Neurosurgery, March 1996, 38(3), 552-557.) considered relevant prior art in that it teaches photodynamic therapy light sources, including red LED sources and "photosensitizers with absorption wavelengths closer to LED peak emissions" (whole document, for example abstract page 552).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AARON J. KOSAR whose telephone number is (571)270-3054. The examiner can normally be reached on Monday-Thursday, 7:30AM-5:00PM, ALT. Friday,EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aaron J Kosar/
Examiner, Art Unit 1651

/Christopher R. Tate/
Primary Examiner, Art Unit 1655